REVIEWS

The next chapter on vegetation gradients and continua should have been tied to the preceding one on the Braun-Blanquet system. Both the collection and presentation of data that are subsequently arranged into continua have been poor. The data cannot be re-arranged. The best documented continua or gradients or ecological series of functional relationships are in work done by the Braun-Blanquet people or by the Russians. Shimwell neglects the Russian work completely, and no more serious mistake in vegetation description and classification could be made. The ecological series documented by Aleksandrova, Sukachev, Ramensky, Wendelberger, Braun-Blanquet himself, Gjaerevoll-to name only a few the reviewer has found useful in teaching-well illustrate vegetation as a factorial function of environmental factors.

Any new book treating the ecology of vegetation is useful. Shimwell's book is no exception. The field is multifarious, expanding rapidly, and there is no consensus on methods, techniques, even goals. Most techniques have not been tested widely. Shimwell's book makes teaching and learning the subject easier. It provides a convenient reference for students. It is not the only text a beginning student should have access to.-JACK MAJOR, Botany Department, University of California, Davis 95616.

Annual Review of Ecology and Systematics. By RICHARD F. JOHNSTON, PETER W. FRANK, and CHARLES D. MICHENER, Eds. Vol. 2, 1971. iv + 510 pp. Annual Reviews Inc., Palo Alto. \$10.

The general reader will be most pleased with this volume, the second in a projected series. On the other hand, plant systematists may find most of the "reviews" of only peripheral interest. The diffuse subject matter of this volume demonstrates the futility of attempting a review of such diverse fields as ecology and systematics and still have a product palatable to either specialty. To place together in one volume articles with titles as divergent as "The sacred in human evolution", and "High-latitude phytoplankton", will either broaden one's reading range or allow one to decide that the few pertinent articles do not justify the purchase of the book and especially not the whole series. Perhaps this difficulty could be alleviated by tailoring alternate volumes for particular readerships.

Among the 19 papers in this issue, 4 contained information of special interest to this reviewer. These were "Adaptive radiation of reproductive characteristics in angiosperms, II: seeds and seedlings" by G. Ledyard Stebbins; "The karyotype in systematics" by Ray C. Jackson; "Arctic and alpine plant life cycles" by Lawrence C. Bliss; and "Seed predation by animals" by Daniel H. Janzen. These are the articles most allied to higher plant systematics, but one is immediately aware from the titles alone, that they are hardly in the main stream of systematic botany.

Stebbins' article is the second in a series that illustrates his thesis that the characters employed by evolutionary biologists in deducing relationships and in erecting systems of classification are expressions of adaptation to particular environmental pressures, and not products of orthogenesis. Seeds and seedlings are crucial stages in the life histories of plants where integration and coordination of morphogenetic events, physiological processes, and morphological form are indispensable and where selection is likely to have a strong influence in molding unique qualities of populations. Successful reproduction and establishment often present conflicting demands upon the organism so that evolutionary compromises, for example, between seed size and number, often result. The adaptive significance of many properties of seeds and seedlings is pointed out based upon gleanings from the meager scattered literature and made cohesive with numerous personal observations by the author.

While Stebbins' paper utilizes only a modest bit of the biological literature, Jackson marshals 174 mostly recent references to update karyotype study as applied to systematics. Only a few years ago one could ascertain the karyotype of an organism by counting the chromosomes, measuring their relative and absolute arm lengths, and noting the occurrence and distribution of secondary constrictions and perhaps associated satellites. Jackson notes that a dozen dimensions are available for a modern karyotype description and observes that new ones continue to be developed. Most of the new approaches utilize developments of molecular biology. His article concludes with an interesting consideration of karyotype evolution interpreted in the light of these newer developments.

Arctic and alpine plant life cycles are admirably described by Bliss. These biomes occupy about 15% of the earth's land surface, and occurring as they do at both ends of the earth and upon the higher mountains even near the equator, present uniquely interesting problems in plant evolution and systematics. Bliss' treatment of the ecology of these regions is an excellent basis for contemplating the evolutionary problems presented by their floras. From the simplest generalizations we are led gently from region to region and into the complexities of tundra community dynamics and on to ecological strategies of particular tundra species. This is one article likely to become well-worn through consultation of the vast amount of information it contains.

Studies of co-evolutionary relationships of plants and animals are receiving attention from increasing numbers of students. Janzen's summary of aspects of seed predation by animals is thus of special value. Although written from the zoological standpoint, it complements well Stebbins' article cited above and also the paper of Harper, Lovell, and Moore that appeared in volume 1 of this series. (Ann. Rev. Ecol. & Syst. 1, 1970). The intricate interactions described by Janzen serve admirably to point up opportunities for research in this enormous subject while also showing the pitfalls of naive interpretations of observations.-DALE M. SMITH, Department of Biological Sciences, University of California, Santa Barbara 93106.

A Classification of the Eucalypts. By L. D. PRVOR and L. A. S. JOHNSON. 102 pp. The Australian National University, Canberra. 1971. (Available from International Scholarly Book Services, P.O. Box 4347, Portland, Oregon 97208, \$3.95, softbound.)

The authors present a summary of their goal of almost two decades–a critically assessed and interpreted new classification of the eucalypts, one which integrates the findings of all workers, and not just their immediate colleagues.

After briefly reviewing both old and new classifications, the authors review the types of characters employed in their "(nonnumerical) phenetic" classification. These include various morphological features, but especially characters of the inflorescence, opercular structure, and ovule and seed coat structure. Evidence from chemistry, biotic associations, and genetics also has been considered.

In an interesting approach to describe stages in the process of evolution in changing environments, the authors recognize seven variation patterns, including one referred to as "Phantom". This last is a term originally proposed by Brett to describe a situation where a formerly widespread parent species has disappeared, leaving only traces of itself in the form of deviant disjunct populations. After giving examples of each of these patterns in *Eucalyptus*, a discussion of generic limits ends with the authors' decision not to recognize separate, segregate genera.

The above is presented in twenty pages, while the remainder of the text is devoted to the actual classification. The present volume does not include formal, nomenclatural changes. What does appear is an infrageneric classification that "... follows a rationalized plan explicitly divorced from the traditional system embodied in the International Code of Botanical Nomenclature". This is effected by assigning a code name of 1-6 letters to each taxon. Thus the code for *Eucalyptus parramattensis* is SNECF, S for subgenus *Symphyomyrtus*, N for section *Exsertaria*, E for series *Tereticornes*, C for subseries *Bancroftinae*, and (finally!) F for the species *E. parramattensis*.